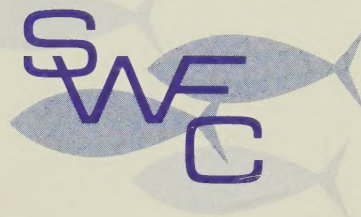




HONOLULU
LA JOLLA
MONTEREY
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SOUTHWEST FISHERIES CENTER

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TIBURON LABORATORY

PACIFIC ENVIRONMENTAL GROUP

MONTHLY REPORT - FEBRUARY 1982

STATUS OF PUBLICATIONS

Administrative Reports

Honolulu Laboratory

Gooding, Reginald M. 1982. Predation on surface and bottom released spiny lobster, *Panulirus marginatus*, in the Northwestern Hawaiian Islands. SWFC Admin. Rep. H-82-1.

La Jolla Laboratory

Bartoo, Norman W. and S. Kume. 1982. Report of the Sixth North Pacific Albacore Workshop. SWFC Admin. Rep. LJ-82-02. .

Hanan, Doyle A. 1981. Proceedings of the 32nd Annual Tuna Conference. SWFC Admin. Rep. LJ-81-29.

Translations

Suisan Shuho (The Fishing and Food Industry Weekly). 1981. The [squid] drift gill net fishery placed under ministry controls...Many large- and medium-scale squid jigging vessels going out of business (Nagashi-ami gyogyō ga daijin shōninsei e...Tsuru gyosen dai-chū gata tomo haigyō kencho). Suisan Shuho (936):15. (Engl. transl. by Tamio Otsu, 1982, 3 p., Transl. No. 60; available Southwest Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96812). [Limited distribution]

Suzuki, Ziro. 1981. Recent condition of the Japanese purse seine fishery and the characteristics of the fishery as seen by the types

of schools fished. (Daichū gata makiami gyohō no kinkyō to sogyō shita gyogun no tsukimono kara mita tōgyogyō no tokuchō ni tsuite.) Proc., 1980 Tuna Fish. Res. Conf. (1980 Maguro Gyogyō Kenkyū Kyōgikai Gijiroku). Fish. Agency Jpn., Far Seas Fish. Res. Lab., p. 252-261. (Engl. transl. by Tamio Otsu, 1982, 13 p.; Transl. No. 61; available Southwest Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96812.)

Approved by Center Director

Hewitt, Roger P. Disposition, mortality and dispersal of northern anchovy larvae in 1978 and 1979. For consideration for publication in CalCOFI Reports.

Squire, James L., Jr. and Daphne V. Nielsen. Migration rates and patterns observed for black marlin (Makaira indica) in the southwest Pacific. For consideration for publication in the NMFS-SSRF Series.

HONOLULU LABORATORY

INSULAR RESOURCES INVESTIGATION

Manuscripts Describing Northwestern Hawaiian Islands Fish Species Being Prepared

This month Richard N. Uchida, Leader of the Insular Ecosystem Study Task, worked with research assistant Darryl T. Tagami to prepare the first draft of a manuscript entitled "The seamount-groundfish trawl fishery in the central North Pacific Ocean," which will be submitted to Marine Fisheries Review for publication. The manuscript is a shorter version of an administrative report which was prepared for presentation at the Western Groundfish Conference held October 18-20, 1981, in Gleneden Beach, Oregon.

Uchida also completed several sections of the "Fishery atlas of the Northwestern Hawaiian Islands," including descriptions of the islands and banks, reviews of climatic and oceanographic characteristics, description of the sampling gear and analytical methods, and discussions on the biology and ecology of six species of fish and shellfish of commercial importance in the Hawaiian fishery.

James H. Uchiyama, Fishery Biologist, and Tagami continued work on the Northwestern Hawaiian Islands (NWHI) atlas by preparing a final listing of 240 species caught during trapping, trolling, and handlining operations, and have started work on a list for trawling operations. The species listing includes data on size range and mean size.

Uchiyama also revised a manuscript co-authored with Tagami on the length-weight relationships of snappers, the grouper, and carangids caught by handline in the NWHI.

Research assistant Michael P. Seki continued his study on the feeding habits of the hapuupuu, Epinephelus quernus, and began preparing a manuscript describing the study.

Shell Specimens Collected in the Northwestern Hawaiian Islands Identified

Research assistant Robert B. Moffitt reports that several interesting shell specimens collected on R/V Townsend Cromwell and F/V Easy Rider Too cruises in the Northwestern Hawaiian Islands were recently identified by Dr. Alison Kay, University of Hawaii, Department of Zoology. Several of these specimens are of species that have not been previously recorded from the Hawaiian Islands: Latiaxis kawamurai (Coralliophilidae), a new species record, from Townsend Cromwell cruise 80-04, Gardner Pinnacles, 78 fathoms, fish trap; Phalium kurodai (Cassididae), a new species record, from Townsend Cromwell cruise 80-04, Necker Island, 156 fathoms, shrimp trap (occupied by hermit

crab); Fusitriton takedai (Cymatiidae), a new species record, from Easy Rider Too cruise 80-02, Midway Island, 150-175 fathoms, fish trap (occupied by hermit crab); and Eudolium inflatum (Tonnacea-family?), a new family record, from Townsend Cromwell cruise 80-04, Necker Island, 156 fathoms, shrimp trap (occupied by hermit crab).

Two specimens are apparently undescribed species: Epitonium sp., Townsend Cromwell cruise 80-04, Necker Island, 156 fathoms, shrimp trap (in an anenome on a shell occupied by a hermit crab); and Fusinus sp., from Easy Rider Too Cruise 80-02, Midway Island, approximately 350 fathoms, shrimp trap. One specimen of this latter species, listed as F. compressus, was taken by the Albatross and deposited in the National Museum but is not recorded in the scientific literature.

Dr. Kay will be publishing these and other new records from other sources in the near future.

Work Continues on Determining the Size-at-Maturity of Spiny Lobster

Research assistant James H. Prescott continued to work on a manuscript describing the size-at-maturity of the spiny lobster, Panulirus marginatus. The manuscript will include a discussion on all the methodology of determining size-at-maturity in the literature.

Because the size-at-maturity of P. marginatus varies considerably, it is evident that more data covering a larger size range are needed. A recent attempt at collecting more specimens by diving was unfruitful. Attempts are presently being made to obtain more specimens through a commercial lobster fisherman. A difficulty with obtaining the needed specimens from trapping is that the catchability of smaller lobsters by conventional trapping methods is low. Apparently this species reaches maturity at a size smaller (particularly the females) than the smallest usually taken by trapping.

Growth Parameters Estimated for Ehu

Fishery biologist James Uchiyama, assisted by research assistant Jeffrey D. Sampaga, has counted the daily growth rings on the sagittae of ehu, Etelis carbunculus (= E. marshi), as part of a continuing study of the periodicity of growth increments on fish otoliths. Using otoliths from fish 23 to 49 cm in fork length (FL), Uchiyama and Tagami determined the following von Bertalanffy growth parameters for ehu: $L_{\infty} = 57.3$ cm; $k = 0.48$; $t_0 = -0.41$ year. Uchiyama noted that the largest ehu caught in waters of the Northwestern Hawaiian Islands was 63.0 cm FL.

* * * * *

Richard N. Uchida has reviewed the "Revised Hawaiian monk seal recovery plan" and completed the second-round questionnaire on monk seal/fisheries interactions for the Northwestern Hawaiian Islands.

Various Lobster Life Stages Identified from Biological Collections

Beatrice L. Burch, Invertebrate Collection Manager of the Bernice P. Bishop Museum, and her co-workers continued to sort and catalog biological material to be transferred from the Honolulu Laboratory collection to the Bishop Museum. Museum assistant Georgia Tien identified several stages of scyllarid lobsters from the Honolulu Laboratory material, including three small gravid lobsters similar to Scyllarus vitiensis (Dana) taken on R/V Townsend Cromwell cruise TC 81-04. To date there have been eight scyllarids taken in midwater which complement the few larger benthic specimens. Phyllosoma stages, including several large specimens, are exceedingly abundant in the collection but no attempt has been made to distinguish the palinurid from the scyllarid species. Compared to the phyllosoma stages, the puerulus stages are sparsely represented in the samples. A few puerulus stages of Panulirus inflata-gracilis and Enoplometropus occidentalis have been found.

FISHERY MANAGEMENT RESEARCH PROGRAM

Early 1982 Hawaii Landings of Skipjack Tuna Below Long-Term Average

The February 1982 Hawaii landings of skipjack tuna were estimated at 31 metric tons (MT), which is 7 MT below the February 1981 landings and 79 MT below the 1964-79 long-term average for February. The cumulative landings from January through February were estimated at 90 MT, which is 16 MT above the 1981 landings for the same period and 174 MT below the 1964-79 long-term average for the same period.

PELAGIC RESOURCES INVESTIGATION

Second Cooperative Squid Research Cruise Completed

Fishery biologist Walter Matsumoto reports that the Hokusei Maru, the University of Hokkaido's research and training vessel, recently completed the second cruise in a planned 3-year cooperative squid research program in Hawaiian waters between the Southwest Fisheries Center's Honolulu Laboratory and the University of Hokkaido.

The objectives of the cruise were to: (1) assess the availability of squid resources in waters around the main Hawaiian Islands by using fishing gear and techniques presently in use in the Japanese squid fisheries, including drift gill nets, midwater trawls, automatic squid jigging machines, and handlines; and (2) determine the squid species present around Hawaii and to identify those with commercial potential. The catches of squid were rather poor, about a third of what was caught on last year's cruise. The most common squid taken during the cruise was tobi-ika, Symplectoteuthis sp.

Scientific personnel participating in the cruise included Matsumoto and biological technician Michael P. Seki; Dr. Tsuneyoshi Suzuki, Faculty of Fisheries, Hokkaido University; Dr. Richard E. Young and Dr. John Shear, University of Hawaii; and Eugene Nitta and John Naughton, Western Pacific Program Office.

Squid Workshop held at Honolulu Laboratory

Tamio Otsu, Chief of the Pelagic Resources Investigation, reports that a squid workshop, supported by the University of Hawaii Sea Grant office and co-chaired by Richard S. Shomura, Laboratory Director, and Dr. Tsuneyoshi Suzuki, Faculty of Fisheries, Hokkaido University, was held on February 16 to discuss the role of squid in the marine ecosystem in Hawaiian waters and to map out a strategy for future squid work in local waters.

The workshop was scheduled to take advantage of Dr. Suzuki's experience in squid research and his timely presence in Honolulu: he was aboard the Japanese vessel, Hokusei Maru, which was in Hawaiian waters on a cooperative squid survey. Other participants in the workshop included Dr. Richard W. Grigg and Dr. Satoru Taguchi, Hawaii Institute of Marine Biology, University of Hawaii (UH); Dr. Richard E. Young, UH; Dr. James D. Parrish, U.S. Fish and Wildlife Service/UH Hawaii Cooperative Fishery Research Unit; Alvin Katekaru, Hawaii Division of Aquatic Resources, Department of Land and Natural Resources; John Naughton and Eugene Nitta, Western Pacific Program Office; and wildlife biologist William G. Gilmartin, fishery biologists Thomas S. Hida, Walter M. Matsumoto, Tamio Otsu, Richard N. Uchida, and Howard O. Yoshida, biological technician Michael Seki, research assistants Walter N. Ikehara and Bert S. Kikkawa, and Dr. Jeffrey J. Polovina, Leader of the Resource Assessment Investigation of the Mariana Archipelago (RAIOMA), Southwest Fisheries Center, Honolulu Laboratory.

Background information was presented by (1) Matsumoto, who spoke on the status of squid fisheries in the western Pacific; (2) Dr. Suzuki - the status of squid fisheries in the eastern Pacific; (3) Dr. Young - species of squids in Hawaiian waters; (4) Hida - results of the seabird food study; and (5) Ikehara - squid as bait in the Hawaiian ika-shibi fishery. In addition, Matsumoto presented results of the first two cooperative squid research cruises and Drs. Suzuki and Young discussed biological results obtained from the first cooperative squid research cruise. Shomura led the discussion on the future of squid research in Hawaiian waters.

* * * * *

Fishery biologist Walter Matsumoto has completed a background paper on "Squid fisheries of the U.S.A." which will be presented at the Standing Committee on Resources Research and Development (SCORRAD) meeting to be held in Sydney, Australia, April 28-May 4, 1982. Matsumoto also prepared a draft outline for a report on the potential impact of deep seabed mining on pelagic fish larvae for submittal to the Office of Ocean Minerals and Energy.

Reports Received on Ongoing Japanese Fishery Surveys

Fishery biologist Tamio Otsu reports that he has gleaned fishery information from conversations held recently with Makoto Makihara and Akihiko Yatsu, two fishery observers from the Japan Marine Resource Center (JAMARC). Otsu met with Makihara and Yatsu when the JAMARC-chartered vessels on which they were stationed, the Shinyo Maru and No. 53 Hoyo Maru, respectively, made rest stops in Honolulu.

The Shinyo Maru was on a 2-month gill netting cruise to survey the pomfret (Bramidae) resource in the Pacific north of Hawaii. Among other areas, the vessel surveyed the Musician's Seamount area where good catches of pomfret are made in the winter. At the time the vessel was in Honolulu, 20 tons of fish had been caught, including 7 tons of sharks (mostly blue shark), 5 tons of pomfret, 3 tons of albacore, 3 tons of striped marlin, and 3 tons of squid. The vessel each day sets 900 shackles of gill nets. Each shackle is 33-m long and 10-m deep; the stretched mesh ranges from 150 to 200 mm, averaging, 170 mm.

The pomfret is considered an underutilized species. Because the Japanese are not familiar with this species, the demand is low and the price is about half that of albacore. JAMARC is presently promoting the utilization of pomfret by developing new recipes and sponsoring cooking demonstrations.

The No. 53 Hoyo Maru is a longliner which carried out shark fishing surveys. JAMARC is also promoting the greater use of sharks in the Japanese market. In 27 days of fishing in an area between Midway and Johnston Islands (roughly between lat. 25° and 15°N), the vessel caught 50 MT of fish, including 25-30 tons of blue shark (the target species), 5 tons of yellowfin tuna, 5 tons of striped marlin, 5 tons of shortbill spearfish, 3 tons of bigeye tuna, and 3 tons of miscellaneous species.

DATA MANAGEMENT AND TECHNICAL SERVICES

Current and Projected Honolulu Laboratory Data Processing Requirements Examined

Following an extensive review and assessment of current and projected Honolulu Laboratory data processing requirements, fishery biologists Fletcher

V. Riggs and Dr. Robert A. Skillman completed a document on the justification for a possible procurement of a minicomputer system for the Honolulu Laboratory. The document was forwarded to La Jolla for the Center Director's review.

Honolulu Laboratory Personnel Complete Course on Computer Software

This month fishery biologist Fletcher V. Riggs, computer programmer Sally H. Kuba, and David C. Hamm, Western Pacific Fishery Information Network (WPACFIN) Data Manager, attended a 1-week training session on USER-11, a data entry, management, and report writing software package for DEC PDP-11 computers running under the RSTS operating system. Various USER-11 programs are already being used for entering data, checking, and editing in the Resource Assessment Investigation of the Mariana Archipelago (RAIOMA) data management system currently being developed by Ronald C. Antinoja, Computer Aid, and it is expected that data entry requirements of other projects will be handled through the USER-11 software package in the future. Although tentatively being used through the East-West Center, Honolulu, computer facilities, this software package is expected to be an important feature in the event that in-house computer facilities become available in the future.

LA JOLLA LABORATORY

Coastal Fisheries Resources Division

COASTAL EASTERN PACIFIC FISHERIES ENVIRONMENT INVESTIGATIONS

Cooperative Albacore Research Projects Planned

Dr. Izadore Barrett, Center Director, and Dr. R. Michael Laurs, Leader of the Fishery-Environment Investigations, attended the American Fishermen's Research Foundation (AFRF) Board of Directors meeting held recently in San Diego to select albacore fishery development/research projects that AFRF will fund in 1982. Laurs recommended the tagging of approximately 1500 albacore in the western and mid-Pacific region to gain further information on migration patterns and migration rates of fish in the proposed northern substock of albacore during their migration across the North Pacific. This information is needed to improve fishery forecasting of albacore distribution and availability and for use in the albacore fishery model which is currently being developed at the Southwest Fisheries Center. The Board decided to fund the tagging experiment recommended by Laurs, as well as other projects to 1) pay fuel subsidies for early season scouting in the Central Pacific in April and in waters off the U.S. west coast in early June, and 2) charter two vessels to conduct fish scouting/research operations for approximate 30-day periods during the normal fishery season in offshore waters off the Pacific Northwest and one vessel in offshore waters off southern California.

For the tagging study, the SWFC will provide tagging equipment and training to fishermen who will conduct the tagging, and AFRF will reimburse fishermen for fish tagged, at the rate of two times the market value of the fish. All the tag-release data and recovery information for those tagged fish which are subsequently recovered, will be deposited at the SWFC where scientists will process and analyze the results. In addition, the SWFC will issue baseball-style caps with an albacore tagging logo to the fishermen who conduct the tagging operation and to those who recover tagged albacore.

The Southwest Fisheries Center will also provide 1) expendable bathythermographic (XBT) equipment, tagging equipment, and data sheets for keeping detailed catch and effort records; 2) instructions for making oceanographic and fishery observations; and 3) training on tagging procedures for fishermen aboard the vessels selected for the charters. SWFC scientists will also process and analyze the information collected by the vessels.

AFRF will spend approximately \$200,000 for albacore scouting/research activities during 1982.

Exploratory Winter Longline Fishing for Albacore Completed

Fishery biologist Dr. R. Michael Laurs reports that six chartered fishing vessels may have discovered a profitable winter fishing area for albacore tuna for U.S. fishermen. The vessels, on charter to the American Fishermen's Research Foundation (AFRF) and working cooperatively with the Southwest Fisheries Center's La Jolla Laboratory, have returned from a 30-day exploratory fishing/research expedition in waters 1000-1500 miles west of San Diego, California. The purpose of the expedition was to evaluate the feasibility of establishing a U.S. longline fishery for albacore tuna in this area during the winter months. The activity was financed by Saltonstall-Kennedy funds awarded to the AFRF and managed by the National Marine Fisheries Service's Southwest Regional Office.

Preliminary evaluations of the expedition results indicate that this winter fishing area would be profitable for U.S. tuna fishermen. While in the fishing grounds, the boats caught an average of about 1/2 ton per vessel per day, with daily high catches of up to 1-1/2 tons. The size of the fish ranged from about 6 to 60 lbs, with 25 lb- and 17 lb-size groups predominating.

In addition to carrying on a longline and limited jig fishery for albacore, expendable bathythermographic (XBT) and temperature observations were made and careful records were kept on the fishing gear and catches. Fishery biologist Dave Holts and biological technicians Dmitry Abramenkoff and Ronald Dotson served as scientific observers on three of the vessels. During the expedition, Dotson tracked several albacore with ultrasonic transmitters; one fish was monitored for 24 hours. The tracking results confirmed the belief that tuna cue on the ocean thermocline (the layer of water separating the warmer, oxygen-rich surface waters from the lower, colder ocean depths).

Laurs and his staff are analyzing the data from the expedition and expect to have a report detailing the results completed by the end of April.

Satellite Remote Sensing Applications in Fishery Research

Fisheries Applications of Coastal Zone Color Scanner Satellite Data

Dr. R. Michael Laurs reports that experiments are being conducted using Coastal Zone Color Scanner (CZCS) data from the Nimbus-7 satellite collected contemporaneously with observations made from ships at sea. The purposes of the experiments are to 1) investigate the small-scale migrations of albacore tuna in relation to oceanographic conditions, and 2) describe ocean processes in relation to northern anchovy spawning and survival of early life stages.

During the albacore study, CZCS data from the Nimbus-7 satellite and AVHRR (Advanced Very High-Resolution Radiometer) data from the NOAA-6 satellite were collected at the Scripps Institution of Oceanography's Remote Sensing Facility, in conjunction with field experiments where: 1) acoustic

telemetering methods were used to track the horizontal and vertical movements of free-swimming albacore, and 2) expendable bathythermographic (XBT) observations were made to determine subsurface ocean thermal structure. Three albacore were tracked for approximately 24 hours and one for about 15 hours. Analysis of the tracking experiments indicated that: 1) the total distances tracked ranged from about 40 to 60 km, with all fish remaining within the same parcel of warm water that was separated from waters to the north and inshore by a 4° F-temperature gradient; 2) tracked fish spent most of the time in waters within and below the thermocline, and only small amounts of time in the upper mixed layer; 3) these fish exhibited marked vertical excursions in depth, with the range being larger during daytime hours than during nighttime hours; 4) the fish spent the majority of time in waters with temperatures considerably lower (about 45° to 60° F) than what has been generally believed to be the optimal temperature preference for albacore (60° to 66° F); and 5) when undergoing vertical changes in depth, the fish within a 20-minute period frequently passed through a vertical gradient of temperature which amounted to 12° to 15° F: about 3+ times greater than the horizontal temperature gradient at the surface as indicated by ship measurements and the infrared imagery.

These findings indicate that the causal factor(s) involved in the aggregation of tuna on the warm side of ocean surface temperature fronts, a phenomenon which has been observed on scientific cruises and is well known by fishermen, and which has economic significance, is probably not related to thermal-physiological mechanism(s) as has been previously suspected. Instead it appears that a behavioral mechanism(s) related to feeding may be responsible. Measurements made by the CZCS in conjunction with the tracking study provide data which support this hypothesis. The diffuse attenuation coefficient of light as it passed through the water column, as measured by the CZCS, indicated a gradient nearly coincident with the sea surface temperature gradient pattern: lower values of k were found in the warmer waters and higher values in the cooler waters. The distribution of color boundaries, as indicated by the ratio of blue:green color bands measured by the CZCS, was also similar to the gradient pattern observed in the diffuse attenuation coefficient. The results of the study show that the albacore remained in water that had a higher water clarity than adjacent waters. This suggests that water clarity, as far as it affects the tuna being able to see its prey, may play a key role in the mechanism(s) underlying the aggregation of tuna on the warm side of ocean surface thermal fronts.

In the northern anchovy study, relationships between ocean color measurements and the distribution of anchovy spawning are being examined. CZCS data collected in conjunction with extensive sampling of anchovy eggs and adults are being used in the study. Dr. Reuben Lasker, Chief of the Coastal Fisheries Resources Division, reports that preliminary results of this study indicate that the distribution of anchovy spawning is related to ocean color boundary patterns and the distribution of chlorophyll.

* * * * *

Dr. Paul Fielder, a recent graduate from Scripps Institution of Oceanography, has joined the staff at the La Jolla Laboratory as a satellite

research specialist. He will provide satellite imagery support and participate in research as part of a cooperative satellite/fishery-oceanography program between the SWFC and the Northwest and Alaska Fisheries Center.

COASTAL EASTERN PACIFIC: POPULATION BIOLOGY OF FISHES

Anchovy Metabolic Rates Studied

Dr. John Hunter, Investigation Leader, reports that Sandy Kaupp, under contract from the University of California, San Diego, has completed some metabolic studies on northern anchovy, incidental to other activities. The resulting data, along with those collected from a variety of other sources, are beginning to provide a useful description of metabolic rates of anchovies. Such measurements are of importance in assessing the capacity of the environment to support anchovy populations of a specific size and for determining the proportion of the daily ration that can be expended for growth and reproduction.

These data indicate that a minimum routine metabolic rate for northern anchovy may be about 10 cal/g wet weight/day (see Table 1). Such a rate may be characteristic of inactive daytime schools and nighttime aggregations of northern anchovy. This value is close to the standard metabolism (metabolism extrapolated by zero speed) of the Peruvian anchoveta as estimated by Villavicencio (1981). Thus, 10 cal/g may be a reasonable estimate of minimum metabolic rates for anchovies in general. To swim at one body length-per-second requires a doubling or tripling of this metabolic rate, indicating that average daily speeds are probably much lower than one body length/sec. The data collected by Villavicencio (1981) on the Peruvian anchoveta using a Brett-style respirometer, and those for northern anchovy based upon starvation of schools in the laboratory, are similar. Both sets of data are lower than those collected by Lasker using a small-volume annular respirometer, indicating that frequent turning or stress caused by this apparatus may have elevated the anchovies' metabolism. Techniques of measurement appear to produce greater differences in measured metabolic rates than do specific differences between these two similar species.

The data in Table 1 can be used to make an approximation of the annual energy costs for northern anchovy. If we assume that an anchovy swims for half a day at 1 body length/sec and for the rest of day consumes energy at the estimated minimum rate, then the daily metabolic cost would be about 20 cal/g/d or a total of about 75,000 calories used in metabolism from age 1 to age 2 years. Using data in Hunter and Leong (1981), the annual energy budget can be computed for anchovy from age 1 to age 2 years as follows: growth 5%; reproduction 8%, metabolism (75K cal) 59%, and fecal and nonfecal losses 28% (calculated by difference from the annual ration). These proportions are in general agreement with literature values for other fishes, indicating that this estimate for metabolism may be relatively close to natural conditions. However, this does not take water temperature into account. Water temperature

probably exerts its greatest effect during the fall season, when temperatures remain high while the planktonic food of the anchovy has declined. The combination of these two factors may place the fish under a high metabolic demand (see table) without the food resources to support it. This may be crucial for the pre-recruit juvenile anchovy which inhabit inshore areas at this time of the year.

Table 1. Various estimates of metabolic rates in anchovies.

Species	Wet Weight g	Temp °C	Method of Estimation	Activity	Metabolic Rate	
					mg O ₂ /kg/h	cal/g/d ¹
Engraulis mordax	12.3	15.2	Caloric state measured before and after 36d starvation period. (Leong, unpub.)	Voluntary swimming in 5m dia. tank.	123	9.7
	16.9 to 13.5	18.0	Caloric state measured before and after 55d starvation period. (Kaupp, unpub.)	Voluntary swimming	123	9.7
	11.7 9.6 8.4	12.0 15.3 21.6	Annular respirometer 45.5 dia. 11.5 cm deep (14.5 l). (Lasker unpub.)	Voluntary swimming of about 1 bl/s.	246 376 547	19.2 29.3 42.6
	17.8 to 16.9	21.0	Caloric state measured before and after 5d of starvation with forced swimming in 11 x 1 x 0.65 m trough. (Kaupp unpub.)	0.83 BL/s	371	29.3
Engraulis ringens	12.6	14.0 16.0 18.0 20.0	Forced swimming in Brett style swimming respirometer. From Villavicencio (1981).	1 bl/s	157 190 230 279	12.6 15.2 18.5 22.4
	12.6	14.0 16.0 18.0 20.0	Extrapolation to zero speed from relation between swimming speed and metabolic rate. From Villavicencio (1981).	None. Standard metabolism.	120 123 150 181	6.2 9.9 12.0 14.5

¹ 1 mgO₂ = 3.25 cal (Brett & Graves, 1979).

Use of Thermoplastic Resin Improves Otolith Reading

Scientists at the Southwest Fisheries Center are currently experimenting with thermoplastic resin to mount otoliths used for age determination studies of fish. Thermoplastic resins have been used for some time to prepare mineral specimens for grinding and etching, but the technique was only recently adopted by Neilson and Geen (1981, Progressive Fish-Culturist 43:90-91) for use with otoliths. In the past, otoliths studied at the SWFC have been mounted in a soft mounting medium which can be redissolved. Otoliths mounted in thermoplastic resin can be remounted by heating the resin. In addition, fishery biologist John Butler reports that increments at the outer edge of the otolith are much clearer because the resin is closer to the optical density of calcium carbonate, causing less refraction of light around the otolith's edge.

Thus it should be much easier and more accurate to estimate instantaneous growth rates using the thermoplastic resin.

Workshop Held on Nutritional State of Fish Larvae

This month fishery biologist Gail Theilacker attended the Sixth Annual Larval Fish Conference held at the University of Maryland's Chesapeake Bay Laboratory. Theilacker presented a talk entitled "Developmental, morphological, and histological characteristics of organs and tissues associated with feeding success" at a workshop on "Approaches to laboratory studies of feeding of fish larvae," and also served as coordinator of a workshop on "Measurement of nutritional state of field samples of fish larvae." At the latter, Theilacker discussed several techniques that can be used to predict the nutritional condition of fish larvae: 1) analyzing larval fish gut contents, 2) analyzing chemical changes during starvation, 3) determining changes in growth rates as discerned by examining the inter-incremental distances between daily growth increments in otoliths, 4) measuring morphological changes, and 5) studying the histology of starving larvae.

Several scientists attending the nutrition workshop presented their approaches for determining larval conditions. Larry Buckley, Northeast Fisheries Center, NMFS, showed that the DNA/RNA ratio drops after the onset of starvation. He believes that this is a useful index of nutritional condition and that it is also useful for determining if larvae were in a period of rapid or slow growth at the time of capture. Richard Radtke, Pacific Gamefish Foundation in Hawaii, discussed some of his data on the use of otoliths as an index on condition and also as a signal of the water temperature experienced by larvae. Allyn Powell, Beaufort Laboratory, NMFS, showed how he had successfully used Theilacker's morphological technique to predict condition of spot fish larvae. And Kim Devonald, National Academy of Sciences, discussed her use of morphometrics to estimate feeding condition of jack mackerel larvae. Theilacker discussed the details of diagnosing starvation by using either a morphological or a histological approach. She showed that the histological technique was extremely sensitive, i.e., identifying larval condition on an individual basis and detecting starvation after only 1 day of food deprivation. The morphological approach, although not as sensitive, is easier to use; thus, routine measurements of larval body parts could be incorporated routinely into ichthyoplankton studies. Theilacker showed how these histological and morphological criteria that were developed for laboratory larvae are now being used to estimate the condition of field-collected larvae.

Theilacker also discussed the problems inherent in using each of the five indices mentioned above to predict the condition of field-collected larvae. For example: 1) large interspecific differences found in gut contents of fish larvae are probably due to the larval gut morphology (larvae with straight digestive tracts probably defecate upon net capture); 2) in order to use the chemical approach, larvae need to be in a fresh condition or quickly frozen while fresh. Thus, larvae must be sorted quickly after net capture; 3) use of

otoliths to determine differences in growth rates of first-feeding larvae depends on the interpretation of the inter-incremental distances near the focus, which is difficult to discern; 4) use of morphological techniques requires the estimation of shrinkage factors for size of all body parts. (Theilacker has shown that the amount of shrinkage that occurs before larvae are killed in a preservative is dependent upon larval fish size and on the extent of handling, i.e., measuring and netting); and 5) special tows need to be taken to collect samples for histological analyses (larvae should be preserved in less than 10 minutes to be assured that no postpartum change has taken place in the tissues).

Theilacker reports that the workshop was well received; many of the scientists attending the workshop were interested in using one or more of these techniques to determine the nutritional condition of marine and freshwater fish larvae in their respective studies.

COMMERCIAL AND RECREATIONAL FISHERIES RESEARCH FOR MANAGEMENT

Draft of 1982 Anchovy Plan Amendment Completed

Alec MacCall, California Department of Fish and Game Marine Biologist stationed at the La Jolla Laboratory and Chairman of the Anchovy Team, has developed a draft amendment describing a procedure for mid-season evaluation of the anchovy stock. MacCall was assisted in this task by SWFC fishery biologists Drs. Gary Stauffer and Rick Methot, and industry economist Dr. Daniel Huppert.

The amendment proposes that the fishery quota be divided into two equal portions, the second of which is to be released in mid-season, pending a favorable stock assessment. The procedure for stock assessment consists of determining qualitative ratings of evidence in six relatively independent categories. The six categories are 1) recruitment from relative age composition, 2) recruitment from abundance information (e.g., young fish surveys), 3) fishery information and performance, 4) acoustic surveys, 5) aerial spotter information, and 6) egg production calibration evidence (e.g., abnormal egg survival rates). The ratings range from 1 to 5, where 1 is "far below expected," 3 is "near expected," etc. Although each component is qualitative in treatment, the average of the six categories will behave relatively quantitatively (due to the central limit theorem), allowing stock status to be treated statistically. If there is a greater than 80% probability that stock abundance is lower than expected, the second portion of the quota will not be released.

This amendment is being developed on a speed-up time schedule under the designation of a non-significant impact (since the fishery will not be altered under normal circumstances). Such a designation allows elimination of some steps in the review process. The amendment will be superseded by the revised anchovy plan which is expected to be implemented in 1984.

Analysis of Anchovy Mortality Rate Updated

Dr. Richard Methot, Fishery Biologist, is working on a further update of the mortality rate of adult anchovy. In addition to including more recent data, his analysis will differ from previous analyses by including younger fish, accounting for the apparent increase in mortality rate of older fish, and accounting for the effect of the fishery on recent high estimates of total mortality. Methot also plans to determine mortality rates of year-classes in addition to mortality rates based on age compositions within cruises.

Two preliminary results have been obtained thus far. Firstly, mortality rates calculated from age compositions in the autumn were found to be always greater than rates calculated from the age compositions during the previous spring. This difference is consistent with the magnitude of the apparent increase in mortality rate with age. Secondly, mortality rates calculated from reconstructed year-classes have a similar mean but a lower year-to-year variance than rates calculated from age compositions within each cruise.

The most important aspect of this work is the attempt to determine age-specific mortality rates. The current estimate of adult mortality is not age-specific and is based only on older fish. This estimate may not be applicable for the present stock which has few older fish.

Computer Simulation of Egg Production Biomass Estimate Developed

Statistician Susan Picquelle has written a FORTRAN program that simulates repeated observations of the anchovy biomass estimate produced by the egg production model. Statistical distributions are specified for each parameter in the model and then random observations are made from these distributions and plugged into the model. The purpose of this study is to examine the variance structure of the estimator; i.e., compare the observed variance with the approximate variance calculated by the delta method (Taylor expansion about the mean). Any possible bias in the estimator will also be studied by comparing the observed value of the biomass estimate of the "true" value calculated by setting each parameter in the model equal to the mean of its specified distribution.

Anchovy Trawl Data Base Designed

With the departure of fishery biologist Dr. Gary Stauffer to the Northwest and Alaska Fisheries Center in Seattle, statistician Susan Picquelle assumed responsibility for the anchovy trawl data. Picquelle has redesigned the data base to consist of three separate data sets, an action arising from a suggestion made at the PERT chart meeting led by David Mackett, SWFC Planning Officer. Each data set will correspond to a stage of data collection: field data, curation, and histology. Thus, upon completion of each stage, the appropriate data set can be keypunched and edited independent of the later stages of data collection.

Growth of Blue Rockfish Analyzed

John MacGregor, Fishery Biologist, has been examining growth of blue rockfish (Sebastes mystinus) an important sportfish taken in waters off California, especially in central and northern parts of the state. Data from southern California on age, length, and weight compares fairly well with that from earlier studies on the Monterey area (Wals, 1952; Miller and Geibel, 1973).

A length-weight curve of the type $W=aL^b$ was calculated ($a = 0.00003132$, $b = 2.979$). This was compared to the same type of curve with a equal to the mean condition factor (0.00002841) and L^b equal to the cube of the length ($b = 3$). At standard length (SL) = 147 mm (smallest fish sampled), the calculated weight equaled 91 grams by the first formula and 90 by the second. At SL = 325 mm (largest fish sampled), W equaled 968 grams and 975, respectively. Actually, the sum of d^2 was slightly lower, by less than 1/2%, for the cubic formula than for the one in which b was calculated.

The fish have been aged, and an age-length curve is being fitted. Blue rockfish are slow growing as is generally true of other rockfishes. The mean observed length at age 1 year was 94.5 mm standard length (total length 116 mm or 4.6 inches); at age 10 years, 263 mm SL (TL = 324 mm or 12.7 inches); and for one fish aged 13 years, 289 mm SL (TL = 356 mm or 14.0 inches). Total length for the blue rockfish is calculated as $SL/0.8127$.

AMRMS Update

Computer programmer Susan Iacometti reports that the 1980 data have been added to the Aerial Marine Resources Monitoring System (AMRMS) data base and that access to this information now exists on the VAX computer system using DATATRIEVE. Plans are now being formulated to transfer the entire system to the VAX, including editing, verifying, updating, and report-generating processes. The testing data, which cover the first 6 months of 1981, are now being keypunched. All of the data from the final quarter of 1981 have not yet been received and the pilots who have not submitted their data have been contacted to report their information.

Manuscript on Seabird-Fishery Trophic Interactions Completed

Alec MacCall, California Department of Fish and Game Marine Biologist stationed at the La Jolla Laboratory, has completed a manuscript entitled "Seabird-fishery trophic interactions in eastern Pacific boundary currents: California and Peru." A talk on the subject was presented at a symposium in January, and the manuscript was sent to the symposium editor. Pending acceptable peer review and revision, the paper will appear in a special publication of the Canadian Wildlife Service, to be published this fall. Copies of the manuscript are available from MacCall on request.

Oceanic Fisheries Resources Division

TUNA/BILLFISH RESOURCES PROGRAM

Joint Research Proposed by NMFS and Caltech on Geomagnetic Orientation and Navigation in Pelagic Fish

Dr. Andrew Dizon, Fishery Biologist, reports that he, Dr. Richard Brill, Fishery Biologist at the SWFC's Honolulu Laboratory, and Dr. Joseph Kirschvink, Division of Geological Sciences, California Institute of Technology (Caltech), have submitted a joint research proposal to the National Science Foundation. The proposal, submitted through Caltech, outlines investigations into "Geomagnetic orientation and navigation by pelagic fish." If funded, the proposed research would be conducted over a 2-year period.

In the proposal, the investigators note that pelagic fish, perhaps more than any other migrating animals, need a reliable reference cue. There is no better cue for deep-swimming aquatic animals than the geomagnetic field. It can provide not only compass direction but time cues and local landmarks as well. The earth's magnetic field has been reliably shown to influence behavior and orientation in a wide variety of organisms. Yet there have only been a handful of studies demonstrating successful conditioning to magnetic fields. Most conditioned responses have been difficult to obtain or have failed replication attempts. The work by Dizon, Brill, and Kirschvink with yellowfin and skipjack tuna, and kawakawa at the SWFC's Kewalo Basin Research Facility in Honolulu is an exception. They have shown that the tropical tunas are easily conditioned to earth-strength fields and that these fish possess magnetite (a highly magnetic iron oxide material) in their ethmoid sinuses in sufficient quantities to serve as the basis for a magnetic sense.

Dizon, Brill, and Kirschvink are proposing to extend their studies into five general areas related to magnetoreception and its use for navigation and migration in pelagic fishes. Using the conditioning experiments, they hope to discover which components tunas respond to in the geomagnetic field. An extensive survey of pelagic animals for the presence of magnetite (marlin, dolphins, and green turtles are also known to have it) is planned. If appropriate, the development and biological synthesis of this mineral will be

examined (magnetite is absent in larval tunas, appearing at a later stage of development). Both scanning and transmission electron microscopy will be utilized to examine the fine structure of the magnetite crystals and their connection to the nervous system. Fishery data will be utilized to search for possible correlations between catch, distribution, and magnetic data. Finally, during the second year of the project, the investigators intend to track wild fish equipped with ultra-sonic transmitters to examine movement patterns during natural and artificial magnetic storms.

Brazilian Scientists Collect Skipjack Tuna Samples for SWFC Studies

Scientists of Superintendencia do Desenvolvimento da Pesca (SUDEPE), Brazil, are cooperating with Southwest Fisheries Center scientists in skipjack tuna studies organized for the International Skipjack Year Program (ISYP) of the International Commission for the Conservation of Atlantic Tunas (ICCAT). Samples of skipjack tuna stomachs and gonads arrived at the SWFC on February 4, 1982 from Rio de Janeiro, Brazil. These are the first in a series of samples expected throughout 1982 to be collected by SUDEPE from commercial baitboats fishing off the states of Rio de Janeiro and Sao Paulo, Brazil. The samples will be analyzed at the La Jolla Laboratory. The number of samples received by month of catch and length of fish are listed below:

Brazilian Skipjack Samples								
Month of Catch								
Length (cm)	November		December		January		Total	
	Gonad stomach		Gonad stomach		Gonad stomach		Gonad stomach	
40 - 49	-	-	18	10	4	4	22	14
50 - 59	4	7	28	22	50	40	82	69
60 - 69	15	6	28	16	39	40	82	62
70 - 79	-	1	1	1	-	-	1	2
TOTAL	19	14	75	49	93	84	187	147

Tuna Fishery Statistics Reported to ICCAT

Preliminary 1981 statistics on U.S. Atlantic tuna fisheries and statistics from the catches of foreign-caught Atlantic tunas transhipped to Puerto Rico have been reported to the International Commission for the Conservation of Atlantic Tunas (ICCAT). The statistics, summarized by Atilio L. Coan, Mathematician, and Dennis Kremer, Computer Programmer, include data on total catch, catch and effort, and length frequencies of tuna caught.

The summaries for the U.S. Atlantic tuna fisheries indicate that 13 United States purse seiners participated in the fisheries. The total catch was 6,700 MT of tunas. The predominant species in the catch were skipjack tuna (3,200 MT) and yellowfin tuna (1,800 MT), with the majority of the catch coming from the eastern tropical Atlantic. Estimated catch rates for the eastern Atlantic were 2.4 MT yellowfin tuna-per-day-fishing and 5.2 MT skipjack tuna-per-day-fishing, compared to catch rates of 0.7 MT for yellowfin tuna and 1.1 MT for skipjack tuna in the western Atlantic. The average fork length of yellowfin tuna caught was 67 cm and 46 cm for skipjack tuna.

Over 4,000 Atlantic yellowfin tuna, bigeye tuna, skipjack tuna and albacore were sampled from the catches of foreign flag vessels by Eugene P. Holzapfel in Puerto Rico during 1981. Most of the samples were from purse seiners and baitboats fishing in the eastern Atlantic. The summaries indicate that average sizes ranged from 52 to 84 cm long for yellowfin tuna, 42 to 58 cm long for skipjack tuna, 50 to 66 cm long for bigeye tuna, and 99 cm long for albacore.

Biological Sampling of Foreign Imports of Atlantic Tunas Continues in Puerto Rico

Atlantic-caught tunas transshipped to Puerto Rico have been sampled routinely for biological information by biological technician Eugene Holzapfel of the La Jolla Laboratory since March 1975. Data on fork length, weight and species composition are collected.

Results of sampling during the period January 1, 1982 to March 1, 1982 are as follows:

Species	Gear	# of samples	# of fish sampled	Tonnage sampled (MT)
Yellowfin	Baitboat	7	584	79.72
	Purse Seine	7	589	780.69
Skipjack	Baitboat	1	50	123.84
	Purse Seine	3	145	1204.79
Bigeye	Baitboat	2	58	35.83
	Purse Seine	2	127	63.92
TOTAL		22	1553	2288.79

MARINE MAMMAL BIOLOGY PROGRAM

Tooth-Reading Record Computer Files Created

Dr. Al Myrick, Leader of the Marine Mammal Age Determination Project, reports that data bases have been created for age determinations made on 1600 teeth of northern offshore spotted dolphins. The data bases consist of four working files with data separated by tooth reader and sex to facilitate editing. The files presently contain approximately 8,000 reading-records. Final readings, now being completed and processed for key punching, are expected to bring the total to 10,000 records. The edit program for these data bases was completed this month by Jay Walker, Computer Programmer contracted by SWFC. The program has been run on one of the working files and the remainder will be checked shortly. Myrick attributes the rapid progress in preparing the data for user access particularly to zoologist Aleta Hohn, and biological technicians Lisa Ankenbrandt, Shannon Fitzgerald, and Priscilla Sloan.

Proceedings of Cetacean Reproduction Conference Being Prepared

Dr. William Perrin, Fishery Biologist, has completed a second draft of the report of the cetacean reproduction conference workshop sessions which were held at the Southwest Fisheries Center, November-December 1981. The draft will be circulated to the 52 workshop participants for review. In addition, approximately one-half of the 50 papers presented at the conference symposium have been received and sent out for review; each submitted paper will be reviewed by at least two anonymous referees.

Elephant Seal Studies Continue at San Clemente Island

January and February are the major breeding months for the northern elephant seal, Mirounga angustirostris, in the California Channel Islands. During late January and early February, Chuck Oliver, Fishery Biologist, traveled to San Clemente Island to count and tag elephant seals at Mail Point. The tags are applied to the hind flippers of the seals, with an attempt made to double-tag the pups (the tagging process was described and illustrated in the September 1981 issue of the SWFC Monthly Report). A total of 16 seals were observed during the period, including 1 dominant adult male, 2 sub-dominant adult males, 5 adult females, 3 one-to-two-year-olds and 5 pups. Of these, 2 of the 5 pups were double-tagged with roto tags. One sub-dominant adult male, 1 adult female and 2 of the one-to-two-year old animals were also tagged. Oliver plans to return in early March, when the pups should be weaned, to tag the remaining pups.

San Miguel Elephant Seal Trip Completed

Dr. Douglas DeMaster, Leader of the Coastal Marine Mammal Project, and Brent Stewart, Hubbs/Sea World Research Institute, spent February 14-26 studying elephant seals at San Miguel Island off the California coast. DeMaster was assisting Stewart, who is conducting a tagging program on elephant seals (as part of a contract with the U.S. Air Force). Over 740 pups were double-tagged with two types of tags: Riese and Roto cattle ear tags. Differences between tag shedding and sightability will be investigated in the future. In addition, estimates of total live births of elephant seals were made in three different ways: mark/recapture estimates, counts of total animals via beach walks, and interpretation of aerial photographs. A comparison of these three estimates will form the basis of a report dealing with estimating pup production. The aerial photographs were taken by Pacific Western Aerial Survey under contract to the SWFC. In addition to estimating pup production, the tagging studies will be used to estimate survival rates, and to determine age-at-first-reproduction, reproductive rates, and movement patterns. Information on the length of pups at weaning and at various molt stages was also collected to compare to data from other elephant seal rookeries. Finally, differences in the timing of tooth eruption of male and female elephant seal pups was confirmed for San Miguel Island. This difference has been previously reported by Dr. B. LeBoeuf, University of California, Santa Cruz, for a number of other rookeries.

The elephant seal research was augmented by total counts of all hauled-out pinnipeds via a beach walk of the entire island. In addition, three Delphinus heads were collected from stranded, dead animals.

Marine Mammal Carcasses Salvaged for Research

During February five marine mammal carcasses were recovered by the Cooperative Marine Mammal Salvage Program: one Lagenorhynchus obliquidens (Pacific white-sided dolphin), three Zalophus californianus, (California sea lion), and one unidentified. The program, whose primary participants are the Southwest Fisheries Center, Naval Ocean Systems Center, and Hubbs/Sea World Research Institute, recovers marine mammal carcasses for research purposes.

Mark Lowry, Biological Technician, has begun working up the pinniped tooth and stomach samples from past strandings that were collected and stored at the SWFC. Zalophus tooth samples from skull and mandible sections were extracted for age determinations, and otoliths and cephalopod beaks were removed from Zalophus stomach samples for food habits studies.

Inventory of Osteological Materials Completed

Biological technician Bill Brinkerhoff has completed an exhaustive physical inventory of cetacean and pinniped osteological specimens held in the freezer at the Southwest Fisheries Center and in the commercial freezer in San Diego, and those specimens in various stages of preparation and curation.

More than 700 specimens have accumulated over the last several years and include specimens used in observer training, those collected by tuna/porpoise observers for taxonomic studies, and those collected in the Cooperative Marine Mammal Salvage Program for studies of stock definition, reproduction, parasites, and feeding habits. An automated data file has been set up for use on the VAX computer system at the University of California, San Diego, which contains relevant data on the collection, sex, length, condition and location of specimen, etc. The next step will be to set priorities for specimen work-up, to identify specimens that can be used for exchange, and to honor outstanding requests for materials by other marine-mammal scientists. Also planned is an expansion of the automated inventory structure to include all specimen materials (teeth, ovaries, worked-up stomach contents, etc.).

MARINE MAMMAL MONITORING AND ASSESSMENT PROGRAM

Meeting Held with Marine Mammal Commission Representatives

Dr. Lee Eberhardt and Dr. James Nofziger visited the La Jolla Laboratory during the week of February 14 to review the Southwest Fisheries Center's research on eastern tropical Pacific dolphins and California coastal marine mammals. Dr. Eberhardt is a member of the Marine Mammal Commission's (MMC) Scientific Committee and Dr. Nofziger is the new Chairman of the MMC. They received an overview of marine mammal research activities conducted at the La Jolla Laboratory from Drs. Gary Sakagawa, William Perrin and Tim Smith. From information gathered during this visit, the MMC will decide whether to conduct an in-depth review of SWFC's research activities later this year.

Dr. Jay Barlow Joins Staff

Dr. Jay Barlow, Operations Research Analyst, has joined the Marine Mammal Monitoring and Assessment Program. His principal assignment will be to analyze biological data collected by the tuna vessel observers for information on mortality rates. Dr. Barlow is a recent graduate of Scripps Institution of Oceanography, where he studied under Dr. Dan Goodman. His dissertation study was on the dynamics of populations of guppies.

Porpoise Observer Data Edited

Al Jackson and Randy Smith have joined the SWFC staff as data editors to assist with porpoise observer data entry and editing. Both Smith and Jackson were previously employed as tuna vessel observers, and each is intimately familiar with the data collection procedures used. Their first task was to assist in correcting errors in the porpoise data bases that were earlier identified by users; these included a group identified during the course of a detailed analysis of the 1979 observer data by fishery biologist Tom Polacheck. Polacheck has been analyzing the observer data on a cruise-by-cruise basis in a study of dolphin school encounter rates, with the aim of eventually measuring the density of dolphin schools.

NOAA Corps Officer Reassigned

LCDR Wayne Perryman has left the Southwest Fisheries Center to assume command of the NOAA research vessel, Chapman, stationed in Seattle, Washington. While at the SWFC, Perryman was responsible for aerial photographic studies of dolphin schools. He demonstrated the possibility of measuring the body length of dolphins from 5" format photographs, a technique which is useful in determining age structure of dolphin schools.

TIBURON LABORATORY

FISH COMMUNITIES INVESTIGATION

Rockfish Biology and Management to be Highlighted at Groundfish Conference

Dr. William Lenarz, Leader of the Rockfish Analysis Task, announced that the Second Western Groundfish Conference, scheduled to be held at the Asilomar Conference Center, Monterey, California, January 10-12, 1983, will include a special session on rockfish biology and management. Lenarz, co-organizer of the Conference, reported that a moderator and seven speakers have accepted invitations to participate in this session. The first formal announcement for the Conference will be made in March.

Index for Feeding Selectivity in Fish Developed

Peter Adams, Fishery Biologist with the Predator/Prey Task, has developed a selectivity index which can be used to determine the extent to which a fish species selects its various prey from among the many potential food items in the environment. Such information would be a valuable aid in analyzing trophic relationships among fishes. The index developed by Adams is based upon an optimal foraging theory that avoids problems which plague the more widely-used existing indices (e.g., Ivlev's and Jacob's) when these are used with natural trophic systems. Adams' index was developed from studies of trophic relationships among nearshore fishes at Santa Catalina Island which were conducted by investigation leader Dr. Edmund Hobson and fishery biologist Tony Chess. The index will be incorporated into the report which analyzes these relationships.

UNDERUTILIZED FISHERIES RESOURCES INVESTIGATION

Trial Fishing Conducted for Yellowfin Goby

Trial fishing is underway in San Francisco Bay to test the commercial feasibility of harvesting the yellowfin goby (*Acanthogobius flavimanus*). This fish apparently was accidentally introduced into the Bay from northern Asia in the early 1960's. It has subsequently become abundant although neither its seasonal nor spatial distribution within the Bay has been documented. It is considered a potential threat to the native fauna of the Bay.

Three fishing trips were conducted in February using a shrimp "try-net." Few gobies were caught but the trials produced fair quantities of Bay shrimp (*Crago* sp.). A market exists for this species in Japan and attempts to keep the gobies alive under various shipping conditions will be made to test the feasibility of using them as live bait in Japan and Hawaii.

Experimental fishing for goby will continue in the Bay through the spring and summer. Test fishing with minnow traps will also be tried.

FISHERIES DEVELOPMENT INVESTIGATIONS

Euphausiid Net Replaced

A 1/16-inch mesh liner for the euphausiid trawl has been ordered to replace the one damaged during the January 12-13 exploratory fishing for euphausiids conducted aboard the NOAA vessel, David Starr Jordan. The net being replaced had ripped two times during previous fishing trials. The new net, which should be ready for the Jordan cruise scheduled in March, will incorporate features which should prevent large tears from occurring in the future.

PACIFIC ENVIRONMENTAL GROUP

FISHERY/ENVIRONMENTAL MODELING AND FORECASTING INDEX

Wind Mixing and Vertical Stability Patterns Studied in Relation to Northern Anchovy Recruitment Success

New climatologies of surface wind and subsurface temperature data have been assembled by LCDR Craig Nelson, NOAA Corps, and David Husby, Oceanographer, to describe the seasonal and geographic distributions of wind mixing energy and vertical stability in the California Current. The patterns were studied in relation to the role of a stable ocean to larval anchovy survival as described by Lasker (1981).

Historical surface marine wind observations from the National Climatic Center's TDF-11 data archive were used to compute long-term monthly means of the cube of the wind speed, by 1-degree squares, in a region extending from 20°N to 50°N latitude, and from the coast to 10 degrees of longitude offshore. Wind speed cubed provides an uncalibrated index of the rate at which turbulent kinetic energy of the wind is added to the upper ocean and becomes available for mixing.

An index of the vertical stability of the water column was also summarized by long-term month and 1-degree square over the same region. Stability depends on the vertical gradients of temperature and salinity; in this case, however, stability was defined in terms of the strength of the thermocline and the index computed from temperature data alone. Thermocline strength was defined as the temperature contrast between the mixed layer temperature and the temperature at the bottom of the thermocline. Mechanical bathythermograph (BT) profiles archived in the Master Oceanographic Observations Data Set (MOODS) at the Naval Fleet Numerical Oceanography Center (FNOCC), Monterey, California, were used to assemble the summary files of the stability index. The BT data were used instead of NODC hydrocasts because (1) the digitized BT profiles provide better vertical resolution, (2) the data are more numerous by a factor of 2 to 5, and (3) Nelson and Husby intend to extend the methods to other eastern boundary current regions (e.g., Humboldt, Canary, and Benguela Currents) for which more complete subsurface data are lacking.

The spatial patterns and annual cycles of these two indices indicate three coastal areas characterized by low mean wind speed cubed and moderate to strong vertical stability: (1) off southern Baja California in the fall, winter, and early spring, (2) in the Southern California Bight throughout the year, and (3) off Oregon and Washington during summer. There is a strong correspondence between these locations and seasons and the locations of the principal spawning grounds and the timing of the peak spawning seasons for each of the subpopulations of the northern anchovy, *Engraulis mordax*. To the extent that pattern recognition allows this relationship to be quantified, these correspondences corroborate Lasker's experimental evidence for his first-feeding hypothesis.

In order to determine the degree to which wind-induced turbulence and stability may have exerted a limiting control on recruitment success over the recent history of the anchovy fishery, Nelson and Husby have also assembled and begun to analyze a 14-year time series of daily mean wind speed cubed indices derived from the FNOG surface pressure analysis. A preliminary examination of these data suggests that the mean value of this index over a spawning season does not contain the appropriate information implied by the first-feeding hypothesis. The time series data must be evaluated in terms of: (1) the required length of low turbulence "windows", (2) the magnitude and duration of high turbulence "events", (3) the frequency with which high turbulence events recur during a spawning season, (4) the timing of the spawning season in relation to a sequence of high turbulence events, and (5) the association of the events with upwelling or downwelling phenomena. Further analysis of these data is being pursued in conjunction with simulation studies using a one-dimensional mixed layer model and a simplified productivity model.

The results of this work and a companion paper by oceanographer Andrew Bakun and fishery biologist Dr. Richard Parrish, which compares and contrasts turbulence and transport in the California and Peru Current systems, have been submitted to CalCOFI Reports.

FISHERIES INFORMATION SYSTEMS AND AUTOMATIC DATA PROCESSING

California Fishery Information Network - A General Description

The Fishery Conservation and Management Act (FCMA), the Endangered Species Act, and other acts have created new data and information requirements. Many of the information systems of the State of California and the National Marine Fisheries Service are inadequate to meet these requirements, and there is an urgent need to upgrade, develop, and integrate the fishery information systems of these various agencies. In particular, the increased data informational needs resulting largely from the establishment of the Pacific Fisheries Management Council under the FMCA of 1976 are imposing requirements on the State which their existing systems cannot accommodate.

The information on the various federal NMFS and State fishery information systems is handled in a very complex manner. Data are collected in one geographical area, inputted into the computer in another area, processed in a third area, and retrieved in still another geographical area. Data are also collected through a variety of methods: delivering receipts ("fish tickets"), dock sampling, fisherman interviews, logbooks, processor's reports, commercial license applications, vessel registration, year licenses, aerial sampling, coded wire tag recoveries, observers aboard vessels, and foreign catch reports. There is little uniformity in formats and codes for recording these data. The quality, comprehensiveness, and timeliness of this information must be improved for the wide variety of users. Public agencies and private organizations need reliable information in order to know what is happening and to make sound decisions.

The California Fishery Information Network (CALFIN) is a cooperative effort among the Southwest Fisheries Center (SWFC), Southwest Region (SWR), and California Department of Fish and Game (CDF&G). The goals of the CALFIN project are to place the data collection, processing, storage and retrieval activities on a consistent and timely basis and remedy current data systems support deficiencies.

The CALFIN is the mechanism designed to collect, access, and communicate the timely, quality, and accurate biological, environmental, socio-economic, and legal data needed to research and manage fisheries in the California area. The CALFIN will include the following activities: (1) the enhancement and modernization of existing fishery information systems; (2) the development and implementation of new fishery information systems; (3) the establishment of a communications network among the CDF&G, SWR, and SWFC data processing centers; and (4) the establishment of aggregated and summarized data banks. The active cooperation of NMFS, States, commissions and councils that collect and use fisheries data is required to achieve a functioning CALFIN. The National Marine Fisheries Service will be the major sponsor of the CALFIN and will provide financial support for those elements that exceed State requirements.

The CALFIN is concerned with the following data types:

1. Data supplied by industry, especially information concerning the catch and value of the catch.
2. Data supplied by the operators of commercial passenger fishing boat operators.
3. Data supplied by commercial fishermen, primarily logs of fishing activity.
4. Data involving boat registrations and fishermen's licenses.
5. Data provided by field personnel that add detail (such as species composition) to the basic data.
6. Preliminary data collected by field personnel to provide information on a more timely basis, such as for enforcing quotas.
7. Basic biological sampling data that support research and management.
8. Data provided by field enforcement personnel.
9. Data involving socio-economic collection and study.
10. Data supplied by recreational surveys.
11. Data supplied by research vessels in the collection of biological and environmental data.

The collection of other data, including data in the recreational and subsistence fisheries and some data required for economic analyses, will also be initiated and incorporated into the CALFIN.

The CALFIN is being developed in phases, with the upgrading of the CDF&G marine statistical system having top priority. The first phase of CALFIN involved a "systems study" which (1) determined how the present State marine fisheries statistics system can be improved to be more responsive to State, Federal, Pacific Fisheries Management Council, industry, and the general public's fisheries information needs, and (2) recommended alternatives for improving the existing State system through changes in policy, methods, and procedures, or through acquisition of personnel and/or equipment. The systems study was completed in February 1981. The recommendations of the systems study were prioritized and will serve as the basis for further work.

Several major activities have already taken place in phase II. The timeliness of CDF&G fish landing data has been greatly improved. The CALFIN has reduced the waiting period for the availability of current landings data from 2 years to 60 days. Backlogged landings data for 1979 and 1980 are being processed in a more timely manner. In phase II and phase III, a "credit card" system is being developed which will greatly improve the quality of fishery landing data. This will be accomplished by having some of the information

imprinted on the receipts when the fish are landed. The "credit card" system would issue each fishermen a card with the appropriate name and number embossed, and each dealer an imprinter to print this information, dealer information, and boat number on the receipt. This will reduce fish receipt error by 40%. The reduced error rate would shorten the editing cycle and insure that accurate information would be available in a timely manner. Fast, accurate information is especially crucial for salmon and some species of groundfish where quotas are used as the major management tool. Another major activity in phase III is the development of a port sampling plan, several new reports on fish landings, and the expansion of the socio-economic data bases.

Installation of Computer Hardware for WPACFIN Completed

David C. Hamm, Western Pacific Fishery Information Network (WPACFIN) Data Manager, has completed installation of microcomputer systems in fisheries offices in both Guam and Saipan, Commonwealth of the Northern Mariana Islands (CNMI). Installation procedures included training at least one individual at each location in the technical aspects of data base design, data and file management, hardware care and maintenance, and operational details of the D. B. Master Data Base Management system. In addition, introductory training on the operation, care, and capabilities of the microcomputer systems was given to about 15 other fisheries staff members. In conjunction with the installation and training process, five fisheries data bases were established, three in Guam and two in Saipan. These data bases will include the vast majority of historical fisheries data in Guam and Saipan and will be the foundation of improved data collection and processing procedures in the future. Although additional training regarding use of some of the software is still required in all island areas, the installation of these two microcomputer systems completes the initial implementation phase of computer hardware upon which the WPACFIN communications network is based.

While in Guam and Saipan, Hamm held a number of meetings with representatives from various agencies, including the Guam Division of Aquatic and Wildlife Resources, Guam Fishermen's Coop, Pacific Basin Environmental Consultants, Pacific Data Systems, and CNMI Department of Natural Resources and Division of Fish and Game. Subjects discussed during some of these meetings included: Completion of the historical data compilation projects in Guam and CNMI and transition into WPACFIN; memorandums of understanding for the cooperative implementation of WPACFIN; agreements of data exchange and confidentiality; establishment and operation of the WPACFIN Data Goals Committee and its Technical Subcommittee; upgrades of data collection and processing procedures to meet management and information needs; and future support and implementation of WPACFIN. All in all, the trip was very successful and all agencies involved displayed a high level of cooperation and an eagerness to move forward with WPACFIN.

Procurement of VAX 11/780 Mini-Computer Sought

In February Dr. Izadore Barrett, Center Director, decided to procure a VAX 11/780 mini-computer for the La Jolla Laboratory in FY 82. Data systems

manager Fred Kellenberger, systems analyst Dorothy Roll, computer programmer analyst Robert Nydam, and key users from the Laboratory's Oceanic and Coastal Fisheries Resources Division (CalCOFI data manager Rich Charter, mathematician Al Coan, oceanographer Larry Eber, fishery biologist Dr. Tim Smith, and biological statistician Bruce Wahlen) met with Les Conklin, the account manager for Digital Equipment Corporation (DEC). They reviewed the configurations of a VAX mini-computer and the costs related to various configurations. After four subsequent meetings, a start-up configuration for a VAX 11/780 was selected. This configuration satisfies the basic user needs and is still within the FY 82 budget. However, to be functional as the Center's major computer power, add-on peripherals are planned for early FY 83. The procurement was proposed to Dr. Barrett and received his approval. The request package justifying sole source procurement is now being prepared. This request procurement will be forwarded to headquarters in Washington, D.C. for approval processing by NMFS, NOAA, and the Department of Commerce.

Norm Piligrino, field Installation Planning Specialist with DEC, met with Kellenberger and Roll on February 12. He inspected the area which houses the existing University of California, San Diego's remote job entry station and detailed the space and environmental specifications necessary for the planned expanded VAX system. One major requirement is the installation of an air conditioner which would filter out the salt air.

Access to UCLA Computer System Approved

The Southwest Fisheries Center's request for limited computer services through September 30, 1982, with the University of California, Los Angeles (UCLA), has been approved by NOAA. Access to UCLA's IBM computer system will support the SWFC Tuna/Porpoise staff in producing reports generated from a debugged version of the BMDP3V statistical package. This version of BMDP is not functioning accurately on the VAX system at the University of California, San Diego (UCSD). Although UCSD and UCLA are part of the University of California academic system, the SWFC's computer contract service with UCSD does not currently include UCLA.

Update of Financial Report System Underway

Dorothy Roll, Systems Analyst, reports that Robert Nydam, Computer Programmer Analyst, is working full-time on testing and debugging the converted Financial Report System. The summary report programs are now functioning but problems still exist in the programs which update the commitment data base from the data entry file. These problems are currently being resolved by John Davies, SWFC Computer Specialist stationed at the Southwest Region.

Two Technical Users Meetings Held in February

The staff of ADP Operations hosted two computer technical users meetings during February. On February 9, Jerry Fitzsimmons from the University of California, San Diego's Computer Center presented general information on the discontinuation of the Burroughs computer system for research projects, and sketched UCSD's plans for the usage of the additional VAX systems. On February 18, systems analyst Dorothy Roll briefed the users on the configuration of the proposed mini-computer systems.

MISCELLANEOUS

NOAA Administrator and Fisheries Head Visit Southwest Fisheries Center

A memorable event for the staff of the Southwest Fisheries Center this month was the visit of Dr. John V. Byrne, Administrator of NOAA, and Mr. William G. Gordon, Assistant Administrator for Fisheries, on Monday, February 22.

During their crowded, one-day visit to La Jolla, Dr. Byrne and Mr. Gordon began their morning with meetings with Nelson Ross of NOAA's Environmental Data Information Service and Lloyd Farrar of the National Ocean Survey's Pacific Marine Center, both stationed at the La Jolla facility. They then held informal meetings with Dr. Gary Sakagawa, Leader of the Oceanic Fisheries Resources Division, and key members of his staff, and with Dr. Reuben Lasker, Leader of the Coastal Fisheries Resources Division, and his task leaders.

It was standing room only in the Center auditorium when Center staff attended a general assembly where Dr. Byrne discussed his reorganization and future plans for NOAA. Mr. Gordon followed with a discussion of organizational changes in NMFS and his expectations and hopes for the future of the fisheries agency. Before beginning his informal remarks, Mr. Gordon presented Center Director Izadore Barrett with a Certificate of Recognition for his "contributions to research activities and analysis for the tuna/porpoise program."

More than 75 staffers then joined Dr. Byrne and Mr. Gordon in a buffet lunch in the courtyard of the Center. The lunch, arranged by the staff, provided an occasion for Center employees to meet and talk informally with the visitors.

In the afternoon, Dr. Byrne and Mr. Gordon visited the nearby Scripps Institution of Oceanography for meetings with Director William Nierenberg, and Sea Grant Director Dr. James Sullivan and his staff.

Dr. Byrne and Mr. Gordon were honored by Dr. Barrett at a reception on the Scripps campus in the evening, providing an opportunity for them to meet with members of local cannery workers and fishermen's union, representatives of the local fishing industry, University of California at San Diego faculty and Sea Grant staff, and environmentalists.

The accompanying photographs of Dr. Byrne's and Mr. Gordon's visit to the Center were taken by Ken Raymond.



Mr. Gordon presents Izadore Barrett, SWFC Director, with a Certificate of Recognition for Dr. Barrett's contributions to the tuna/porpoise program.



Dr. Sam Herrick (left) and Dr. Mike Laurs (right) exchange views with Dr. Byrne.



Dr. Byrne and Center Director Barrett (center background) join Center staff members at an al fresco luncheon.



Mr. Gordon (center) discusses fisheries matters with Center staff at luncheon.

HONORS AND AWARDS

Center Director Receives Recognition for Contributions to Tuna/Porpoise Program

During the visit here on February 22 of NOAA Administrator John V. Byrne and William G. Gordon, Assistant Administrator for Fisheries, Center Director Izadore Barrett was presented with a Certificate of Recognition, which carries a cash award, for his "contributions to the research activities and analysis for the tuna/porpoise program."

Tiburon Laboratory

Dr. William Lenarz, Fishery Biologist, received a Special Act Award for his part in developing the First Western Groundfish Conference, held in October 1981.

PUBLIC AFFAIRS

Honolulu Laboratory

This month three fishery biologists from the Honolulu Laboratory acted as judges for science fairs held at local schools: Richard Uchida served as Associate Judge at the Science and Engineering Fair of Lanakila Baptist Intermediate and High School, Dr. Robert Skillman served as a judge at science fairs at Aiea High School and St. Louis High School, and Reginald Gooding served as Chief Judge at the science fair of Kailua Intermediate School and Punahou School.

PRESS RELEASE

Honolulu Laboratory

February 17 - "NOAA research vessel to survey waters around Guam and the Commonwealth of the Northern Mariana Islands."

SEMINARS

Honolulu Laboratory

- February 5 - William G. Gilmartin, Honolulu Laboratory, SWFC, spoke on "Captive maintenance of Hawaiian monk seal pups at Kure Atoll, 1981."
- 26 - George H. Balazs and William G. Gilmartin, Honolulu Laboratory, SWFC, showed two professionally-produced films illustrating various ecological aspects of sea turtles, and led a discussion period following the screening of the films.

La Jolla Laboratory

- February 3 - Dr. Andrew Dizon, La Jolla Laboratory, SWFC, presented a talk on "The geomagnetic field in tuna" at a meeting of the American Institute of Fishery Research Biologists, Southern California District, held at the La Jolla Laboratory.
- 9 - Dr. Jeannette Thomas, Hubbs/Sea World Research Institute, San Diego, California, gave a seminar on "Passive acoustic techniques for assessing marine mammals."

Tiburon Laboratory

- February 24 - Dr. Mark Mangel, University of California, Davis, presented a talk on "Possible effects of aggregation in the widow rockfish fishery" as part of a continuing series of cooperative seminars sponsored by the Tiburon Laboratory and the Tiburon Center for Environmental Studies, San Francisco State University.

TRAINING

La Jolla Laboratory

- February 8-11 - Ken Bliss and Ron Lynn, Oceanographers - "International STD Conference and Workshop," La Jolla California.

VISITORS

Honolulu Laboratory

- February 5 - Tamio Otsu and Randolph K. C. Chang, Manager of the NMFS Kewalo Research Facility, provided a tour of the Facility for students and officers from the Hokkaido University's training vessel, Hokusei Maru.
- 9 - Fletcher Hands from Oxford, Maryland, accompanied by Felix Smith of Honolulu.
- Ken Hirayama, local representative of the Japan Fisheries Association.
- 19 - Akihito Yatsu, JAMARC observer on the No. 53 Hoyo Maru, a Japanese longliner, visited Tamio Otsu.
- 24 - Dr. Lynwood S. Smith, Fisheries Research Institute, University of Washington, Seattle, Washington, visited Laboratory Director Richard Shomura. Dr. Smith also met with Dr. Robert Skillman, Dr. Jerry Wetherall, and Dr. Richard W. Brill, Leader of the Pelagic Ecosystem Study, and visited the NMFS Kewalo Research Facility.
- 26 - Dr. Cliff Newell, Northeast Fisheries Center, Woods Hole, Massachusetts, visited Richard Shomura, Laboratory Director.

La Jolla Laboratory

- February 1 - Robert Payne, United Nations Food and Agriculture Administration, came to the Center to meet with Dr. Izadore Barrett, Center Director, and Dr. James Joseph, Inter-American Tropical Tuna Commission.
- Fred Weiss, Bureau of Land Management, visited with Dr. Reuben Lasker, Chief, Coastal Fisheries Resources Division.
- 2 - Dale Ingmanson, San Diego State University, California.
- 16 - Michael Lipson, National Weather Service, came to the Center to discuss WWD funding with Ben Remington, Executive Officer.

- 19 - Dennis Weidner, Office of International Fisheries Affairs, Washington, D.C., visited the Center to talk with Dr. Izadore Barrett, Center Director, and Dr. Gary Sakagawa, Chief, Oceanic Fisheries Resources Division.

Pacific Environmental Group

- February 17 - Professor Allen Robinson, Harvard University, Boston, Massachusetts, visited PEG to discuss the hydrographic data base in the California Current region with LCDR Craig Nelson.

Tiburon Laboratory

- February 8 - Mike Reno, Environmental Protection Agency, San Francisco, California.
- 12 - Tom Cannon, Envirosphere, Concord, California.
- 15 - Bruce Wyatt, Sea Grant College Program, University of California, Davis.
- 18 - Pete Kalvass, California Department of Fish and Game (CDF&G), Menlo Park, California.
- Jim Lytle and Joe Lesh, CDF&G, Eureka, California.
- Pat O'Brien, CDF&G, Sacramento, California.
- 19 - Eddie Tate, NOAA/NASO, Seattle, Washington.

MEETINGS AND TRAVEL

Honolulu Laboratory

- January 26- February 2 - Dr. Jeffrey Polovina traveled to Guam and Saipan for the RAIOMA (Resource Assessment Investigation of the Mariana Archipelago) field work with collaborating scientists.
- January 26- February 10 - David Hamm traveled to Saipan and Guam to install microcomputers for the Western Pacific Fishery Information Network (WPACFIN) program. He also reported on the progress of WPACFIN at the Western Pacific Region Fishery Management Council meeting.

- February 11 - Laboratory Director Richard Shomura attended a seminar at the University of Hawaii, presented by William Bodde, former U.S. Ambassador to Fiji, who is presently Diplomat-in-Residence at the East West Center in Honolulu.
- 16 - An all-day squid workshop was held at the Honolulu Laboratory.
- 18 - Laboratory Director Richard Shomura convened a meeting at the Laboratory to discuss a comprehensive draft planning document prepared by fishery biologist Richard Uchida. Attending the meeting were Reginald M. Gooding, Tamio Otsu, Dr. Jeffrey Polovina, Dr. Stephen Ralston, Dr. Robert Skillman, Uchida, Dr. Jerry A. Wetherall, and Howard Yoshida.
- 19 - Richard Shomura attended a meeting of the Hawaii Fisheries Coordinating Council at the Hawaii State Department of Land and Natural Resources Board Room.

La Jolla Laboratory

- February 1-3 - An IATTC training class for tunaboat observers was held at the Center.
- 3-5 - Charles Oliver and Mark Lowry traveled to San Clemente Island, California, to conduct studies on elephant seals.
- 4 - Dr. Reuben Lasker, Dave Mackett, and Alec MacCall (California Department of Fish and Game) met to discuss egg sampling.
- A meeting on egg sampling was held at the Center.
- Dr. Reuben Lasker attended a Satellite User's meeting at Scripps Institution of Oceanography, La Jolla, California.
- An EEO Committee meeting was held at the Center.
- 4-5 - Fred Kellenberger, Data Systems Manager, met with California Department of Fish and Game programmers at the Center.
- 8 - An Anchovy Plan Amendment meeting was held at the Center.

- 8-11 - Fred Kellenberger traveled to Washington, D.C. to attend a National Data Management Committee meeting.
- 9-10 - Dr. Izadore Barrett, Center Director, traveled to Monterey and Tiburon, California, to discuss Merit Pay Plans and administrative matters at the Pacific Environmental Group and Tiburon Laboratories.
- 10-11 - Charles Oliver traveled to San Clemente Island, California, to conduct studies on elephant seals.
- 11 - Dr. Izadore Barrett attended an Underwater Park meeting in La Jolla, California.
- 12-28 - Dr. Doug DeMaster traveled to San Miguel Island, California, to tag elephant seal pups.
- 15-18 - Dr. Norm Bartoo traveled to Miami, Florida, to present a paper on fish ageing and participate in a Tuna/Shark/Billfish Ageing Workshop.
- 16 - A CalCOFI meeting was held at the Center.
- 21-26 - Ben Remington, Executive Officer, traveled to Washington, D.C. to participate in NMFS budget and planning meetings.
- 22 - A General Staff Meeting was held at the Center. Dr. John Byrne, Administrator of NOAA, and William Gordon, Assistant Administrator for Fisheries, NOAA, spoke to those present.
- 22-26 - David Mackett traveled to Washington, D.C. to attend a Planner's conference.
- 24-26 - Dr. John Hunter traveled to Seattle, Washington, to attend the annual meeting of the NMFS Publication Advisory Committee.
- 24-27 - Dr. Geoff Moser traveled to Ocean Springs, Mississippi, to chair a meeting of the Ahlstrom Memorial Symposium and Book Steering Committee, at the Gulf Coast Research Laboratory.

Tiburon Laboratory

- February 10 - Dr. Izadore Barrett, Center Director, Norman Abramson, Tiburon Laboratory Director, and Edward Ueber traveled to Sacramento, California, to attend the Ninth Fishermens' Forum. At the Forum fishermen present

their opinions on fishery problems to the Joint Committee on Fisheries and Aquaculture of the California Legislature.

- 18 - Bill Leet traveled to Monterey, California, to deliver a net sounder to a fisherman who plans to experiment with midwater trawling.
- 24-25 - Susumu Kato traveled to Morro Bay, California, to participate in a "Groundfish Forum" sponsored by the Sea Grant Program and the California Department of Fish and Game. The meeting was attended by nearly a hundred people. Kato presented a report on "Fishery Development Activities of the Tiburon Laboratory."
- 24-26 - Laboratory Director Norman Abramson attended the Groundfish Forum in Morro Bay, then traveled to San Luis Obispo and Monterey, California, with Mel Odemar of the California Department of Fish and Game to meet with CDF&G port biologists and to discuss sampling procedures.

PERSONNEL ACTIONS

Honolulu Laboratory

- January 24 - Rodney T. Watson, Biological Aid - Conversion to Excepted Appointment.
- February 1 - Henry M. Kishinami, Biological Aid - Part-time, Temporary Appointment.
- 7 - Richard W. Brill, Supervisory Fishery Biologist - Full-time, Permanent Appointment.
- 21 - C. Edward Bowlby, Wildlife Biologist - Full-time, Temporary Appointment.

La Jolla Laboratory

- February 12 - Bob Butler, Computer Specialist - Resignation.
- Nate Kostrubala, Computer Clerk - Resignation.
- 16 - Jay Barlow, Operations Research Analyst - Termination of Appointment.

- 22 - Paul Fiedler, Physical Science Technician - Temporary Full-time Appointment.
- Marilyn Mansfield, Student Volunteer - Begin Duty.
- Shari Sitko, General Biologist - Extension of Temporary Appointment.
- Janis Willey, Student Volunteer - Begin Duty.

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